

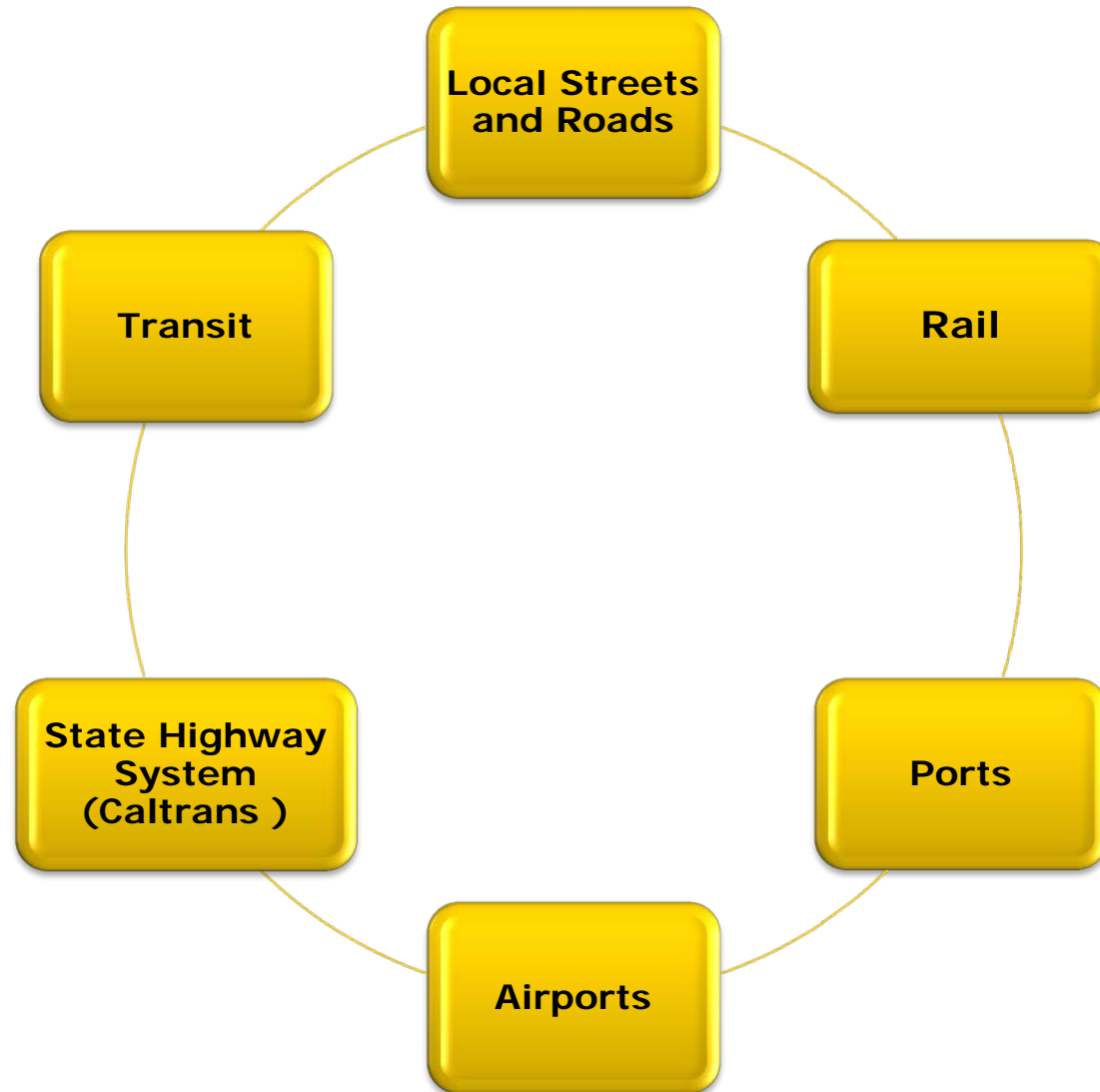
# **Safeguarding California: Preparing for Climate Risks**

## **Transportation Sector**



**California Department of Transportation (Caltrans)**  
**Division of Transportation Planning**

# Transportation in California



# Caltrans Overview

- Owner and operator of the State Highway System (SHS)
- Responsible for transportation planning, design, programming, construction, and maintenance of the SHS
- 265 State Highways
- Over 50,000 Lane Miles
- Over 177 billion annual vehicle miles of travel

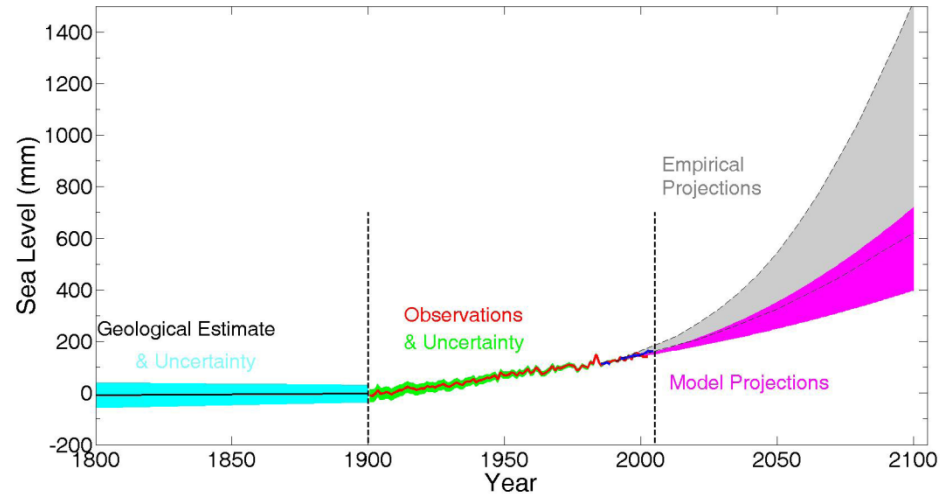




# Sea Level Rise and Storm Surge

Climate Impact	Potential Transportation Impact
Sea Level Rise	<ul style="list-style-type: none"> <li>• Roadway washout</li> <li>• Flooding of roadways</li> <li>• Disruption of transit services</li> <li>• Bridge Scour</li> <li>• Railway flooding</li> <li>• Damage to roadway substructure</li> <li>• Route closure</li> <li>• Travel Delays</li> <li>• Increased need for emergency response services</li> </ul>

Estimated, observed and projected sea level rise for 1800 – 2100  
National Academies of Sciences "Sea Level Rise for the coasts of California, Oregon and Washington" 2012



Rising sea levels threaten low lying transportation infrastructure



Storm surge flooding the roadway  
District 1

# Changing Precipitation Patterns

Climate Impact	Potential Transportation Impact
Increase in intense precipitation events	<ul style="list-style-type: none"><li>• Flooding of roads and railways</li><li>• Landslides</li><li>• Road washouts</li><li>• Route closures</li><li>• Travel delays</li><li>• Increased need for emergency response services</li><li>• Bridge scour</li></ul>



Lane closure on I-505 due to flooding



Landslide after a heavy rainfall



Flood and landslide on I-80



# Increased Temperatures

Climate Impact	Potential Transportation Impact
Higher Temperatures	<ul style="list-style-type: none"><li>• Highway asphalt rutting</li><li>• Highway asphalt buckling</li><li>• Concrete deterioration</li><li>• Route closures</li><li>• Travel delays</li><li>• Limits on periods of construction activity</li><li>• Rail buckling</li><li>• Increased thermal expansion of bridges</li><li>• Changes to biodiversity/vegetation</li><li>• Increase in wildfires and mudslides</li></ul>



Roadway Pavement Buckle



Railroad sun kink



Higher temperatures and extreme heat events will necessitate more night time work



# Wildfires



Crews replacing burned guardrails on US 50



SR 13 and SR 24 serving as emergency response staging area during a local wildfire



# Climate Change Roles at Caltrans

## Transportation Planning

- Policy level GHG issues
- Calculate annual emissions from Caltrans operations
- Identify opportunities to reduce emissions from Caltrans operations

## Environmental Analysis

- Project level GHG emissions analysis
- Address climate change related issues during the environmental document phase of projects

## Traffic Operations

- State Highway System operational efficiencies
- Reduce GHG emissions from the traveling public by reducing “stop and go” traffic
  - Ramp meters
  - Managed lanes

## Maintenance

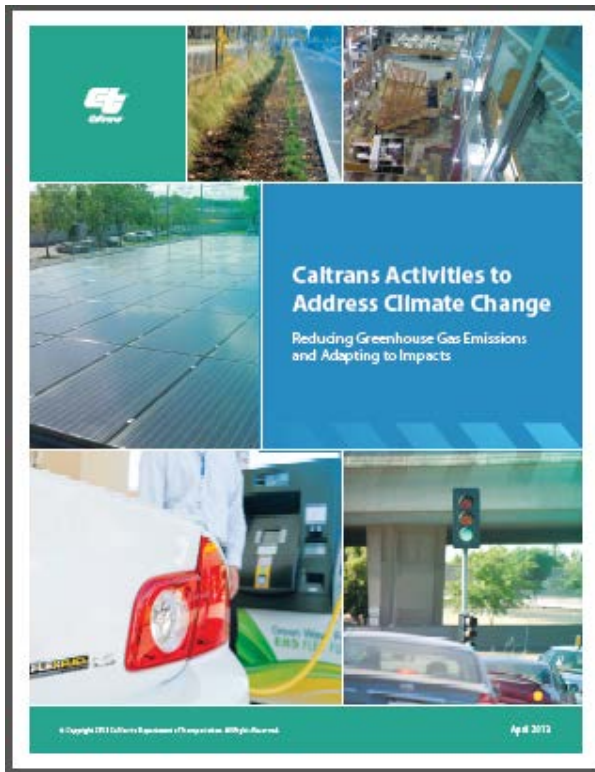
- Maintain asset data important to adaptation planning
- First responders to impacts from extreme events and disasters



# Caltrans Activities to Address Climate Change

## 2011 GHG Reduction Efforts at Caltrans

Strategy	Average annual GHG reductions
Alternatives to conventional concrete	47,236
Alternatives to conventional asphalt	61,475
<b>Total – materials, concrete and pavement strategies</b>	<b>108,711</b>
Roadway lighting	38,819
Alternative fuels and vehicles	2,182
<b>Total – operations and maintenance strategies</b>	<b>41,001</b>
Renewable energy projects	1,391
Building energy and water efficiency	3,511
Workplace commute programs	6,465
<b>Total – facilities and administration strategies</b>	<b>11,367</b>
<b>TOTAL</b>	<b>161,079</b>



# Caltrans Activities to Address Climate Change

*Guidance on Incorporating Sea Level Rise*

CALIFORNIA DEPARTMENT OF TRANSPORTATION

## Guidance on Incorporating Sea Level Rise

For use in the planning and development of  
Project Initiation Documents

Prepared by the Caltrans Climate Change Workgroup, and the HQ Divisions of  
Transportation Planning, Design, and Environmental Analysis

May 16, 2011

This guidance is intended for use by Caltrans Planning staff and Project Development Teams to determine whether and how to incorporate sea level rise concerns into the programming and design of Caltrans projects. Because of the evolving nature of climate change science and modeling, this guidance is subject to revision as additional information becomes available.



**CAMBRIDGE**  
SYSTEMATICS

## Addressing Climate Change Adaptation in Regional Transportation Plans

*A Guide for California MPOs and RTPAs*

## final report

*prepared for*

**California Department of Transportation**

*prepared by*

**Cambridge Systematics, Inc.**

*with*

ESA PWA  
W & S Solutions

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February 2013

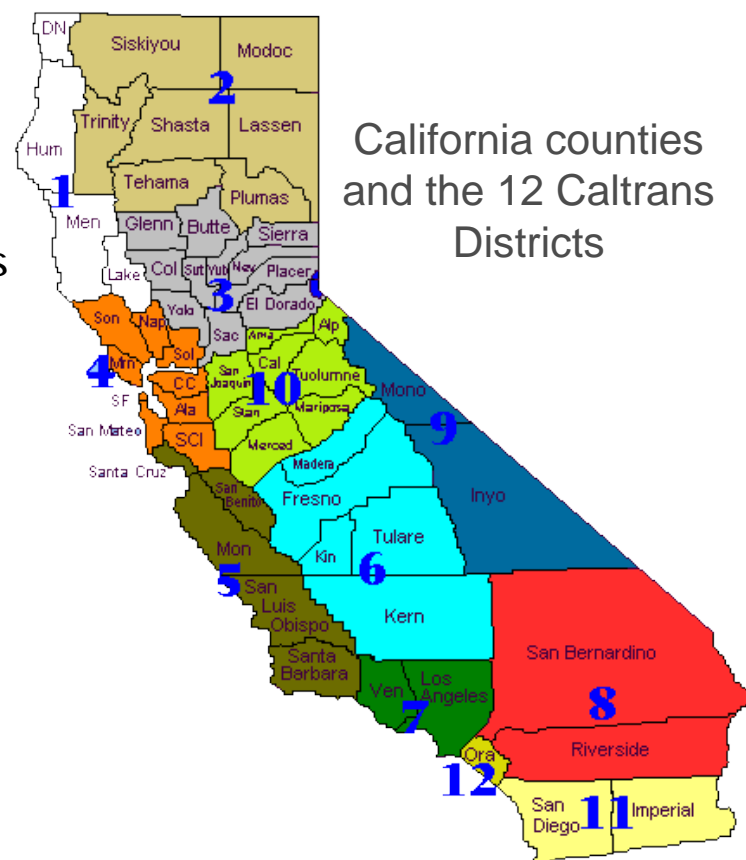
[www.camsys.com](http://www.camsys.com)



# Upcoming Project to Address Climate Change

- District Climate Change Vulnerability Assessments

- Assessment of assets vulnerable to impacts from climate change and extreme events
- Will allow each District to identify and prioritize mitigation efforts
- Map showing vulnerable segments of the state highway system and a report of the findings will be prepared for each District



# Thank You

Caltrans Climate Change Branch

[www.dot.ca.gov/hq/tpp/offices/orip/climate\\_change/index.shtml](http://www.dot.ca.gov/hq/tpp/offices/orip/climate_change/index.shtml)

